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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/599,813	07/17/2007	Anand Chellappa	37929-32102	5027

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BAKER & HOSTETLER LLP  
WASHINGTON SQUARE, SUITE 1100  
1050 CONNECTICUT AVE. N.W.  
WASHINGTON, DC 20036-5304

EXAMINER
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HANDAL, KAITI V

ART UNIT	PAPER NUMBER
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1723

NOTIFICATION DATE	DELIVERY MODE
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11/21/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patents@bakerlaw.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/599,813	<b>Applicant(s)</b> CHELLAPPA, ANAND	
	<b>Examiner</b> KAITY HANDAL	<b>Art Unit</b> 1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 August 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on \_\_\_\_; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 5) ☒ Claim(s) 1-15, 17 and 19-35 is/are pending in the application.
- 5a) Of the above claim(s) 1-14 and 29-31 is/are withdrawn from consideration.
- 6) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 7) ☒ Claim(s) 15, 17, 19-28 and 32-35 is/are rejected.
- 8) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 9) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____.                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date ____.  | 6) <input type="checkbox"/> Other: ____.                          |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 15, 17, 24-28, 32-33 are rejected under 35 U.S.C. 102(b) as being anticipated by Wieland et al. (US 2004/0063577).

With respect to claims 15 and 32, Wieland teaches an apparatus comprising: a single hydrogen reactor chamber (Fig. 1) (Abstract) in which is disposed a plurality of steam reformation catalysts disposed therein (3 & 4) (as illustrated) to form a staged configuration (as illustrated), the staged configuration comprising a series of distinct zones or portions (as illustrated), each zone or portion in physical contact with at least one other zone or portion (as illustrated) and each zone or portion containing at least one of the plurality of steam reformation catalysts; wherein a feed stream passed in the reactor chamber is exposed to the plurality of catalysts in a predetermined sequential manner ([0047]), and wherein said plurality of steam reformation catalysts includes a high-activity steam reformation catalyst (4), a coke-resistant steam reformation catalyst

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(3) and a steam reformation catalyst which promotes a water-gas shift reaction (para. [0038], [0039], [0044], [0047]) (as illustrated).

With respect to claim 17, Wieland teaches wherein the coke-resistant steam reformation catalyst (3) is loaded at an entrance of said hydrogen reactor chamber (as illustrated).

With respect to claim 24, Wieland teaches wherein said coke-resistant steam reformation catalyst (3) is loaded at an entrance of said steam reformer, followed by said high-activity steam reformation catalyst (4) (as illustrated).

With respect to claim 25, Wieland teaches wherein the high activity steam reformation catalyst comprising at least one noble metal component (page 4, para. [0050]).

With respect to claims 26-27, Wieland teaches wherein the plurality of catalysts are coatings supported on a substrate comprising monolith honeycomb bodies (page 3, para. [0035]).

With respect to claim 28, Wieland teaches wherein a fuel cell is in fluid communication with the hydrogen generation reactor (page 1, para. [0008]).

With respect to claim 33, Wieland teaches wherein the end of each zone or portion is in contact with another zone or portion is an abrupt end (as illustrated).

3. Claims 15, 17, 19-20, 24-28 and 32-33 are rejected under 35 U.S.C. 102(e) as being anticipated by Wieland et al. (US 7,150,866).

With respect to claims 15 and 32, Wieland teaches an apparatus comprising: a single hydrogen reactor chamber (Fig. 2) (Abstract) in which is disposed a plurality of steam reformation catalysts disposed therein (3 & 4 & 5) (as illustrated) to form a staged configuration (as illustrated), the staged configuration comprising a series of distinct zones or portions (as illustrated), each zone or portion in physical contact with at least one other zone or portion (as illustrated) and each zone or portion containing at least one of the plurality of steam reformation catalysts; wherein a feed stream passed in the reactor chamber is exposed to the plurality of catalysts in a predetermined sequential manner (col. 6, lines 9-22 and col. 7, lines 63 – col. 8, lines 1-10); and wherein said plurality of steam reformation catalysts includes a high-activity steam reformation catalyst (4), a coke-resistant steam reformation catalyst (3) and a steam reformation catalyst which promotes a water-gas shift reaction (5) (col. 4, lines 52-65) (as illustrated).

With respect to claim 17, Wieland teaches wherein the coke-resistant steam reformation catalyst (3) is loaded at an entrance of said hydrogen reactor chamber (col. 6, lines 18-20) (as illustrated).

With respect to claims 19-20, Wieland teaches wherein said high-activity steam reformation catalyst (4) and said coke-resistant steam reformation catalyst (3) are supported/doped nickel-based catalysts/(transition metal oxides) (col. 5, lines 34-42).

With respect to claim 24, Wieland teaches wherein said coke-resistant steam reformation catalyst (3) is loaded at an entrance of said steam reformer, followed by said high-activity steam reformation catalyst (4) (as illustrated).

With respect to claim 25, Wieland teaches wherein the high activity steam reformation catalyst comprising at least one noble metal component (col. 6, lines 35-41).

With respect to claims 26-27, Wieland teaches wherein the plurality of catalysts are coatings supported on a substrate comprising monolith honeycomb bodies (col. 4, lines 3-11).

With respect to claim 28, Wieland teaches wherein a fuel cell is in fluid communication with the hydrogen generation reactor (col. 1, lines 5-15).

With respect to claim 33, Wieland teaches wherein the end of each zone or portion is in contact with another zone or portion is an abrupt end (as illustrated).

### ***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 21-23 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Wieland (US 7,150,866) as applied to claim 15 and 20 above.

With respect to claims 21-23, Wieland discloses all claim limitations as set forth above, including wherein the platinum group metal is supported on at least one oxide selected from oxides of alkaline earth metals and oxides of transition elements and

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oxides of rare earth metals (col. 5, lines 25-41), therefore, it would be obvious if not inherent that the reforming catalyst taught by Wieland would be a platinum group metal supported by nickel oxide and potassium oxide, for example, as one of the choices taught by Wieland; which catalyst would be obvious to one having ordinary skill in the art at the time of the invention to choose to make based on Wieland's teaching.

6. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wieland et al. (US 7,150,866), as applied to claim 32 above, and further in view of Hwang et al. (US 6,436,363).

With respect to claims 34-35, Wieland teaches providing a graded catalyst arrangement (col. 6, lines 9-22 and col. 8, lines 1-10), but fails to explicitly teach wherein the end of each zone or portion is in contact with another zone or portion is characterized by a decreasing gradient of one or more catalysts and an increasing gradient of another. However, it is well known in the art that a graded catalyst comprising a catalytic partial oxidation and a steam reforming catalyst combination can be applied such that the graded catalyst layers comprises a decreasing gradient of one or more catalysts and an increasing gradient of another as evidenced in Hwang et al. (see Fig. 3) (col. 7, lines 41-64). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to have the graded catalyst layers of Wieland comprise a decreasing gradient of one or more catalysts and an increasing gradient of another since it is well known in the art to do so as evidenced by Wieland.

7. Claims 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wieland et al. (US 2004/0063577), as applied to claim 32 above, and further in view of Hwang et al. (US 6,436,363).

With respect to claims 34-35, Wieland teaches providing a graded catalyst arrangement ([0047]), but fails to explicitly teach wherein the end of each zone or portion is in contact with another zone or portion is characterized by a decreasing gradient of one or more catalysts and an increasing gradient of another. However, it is well known in the art that a graded catalyst comprising a catalytic partial oxidation and a steam reforming catalyst combination can be applied such that the graded catalyst layers comprises a decreasing gradient of one or more catalysts and an increasing gradient of another as evidenced in Hwang et al. (see Fig. 3) (col. 7, lines 41-64). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to have the graded catalyst layers of Wieland comprise a decreasing gradient of one or more catalysts and an increasing gradient of another since it is well known in the art to do so as evidenced by Wieland.

### ***Response to Arguments***

8. Prior Art Rejection: Applicant's arguments filed 9/28/2011 have been fully considered but they are not persuasive.

a. On page 10 of the remarks, Applicant argued the following:

Applicants respectfully submits that Wieland fails to disclose, "a series of distinct zones or portions."

It is axiomatic that a skilled artisan will recognize the term "series" necessarily requires "sequence", i.e., in a passage from an inlet to an outlet, the first zone must be



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traversed, and that following traversal of the first zone, the second zone must be traversed, and so on. According to the *Dictionary of Engineering Terms*,<sup>3</sup> a series is, "[a] method of connecting the elements of an electrical circuit..., so that current flow is common to all the elements of the circuit... [i]f one circuit element fails, the circuit is broken and the current flow ceases in all the circuit elements." Applicants submit that this particular definition of "series," while it resides in the context of electric circuits, etc."

b. On page 12 of the remarks, Applicant argued the following:

Wieland at col. 3, lines 53-55, reinforces that it is non serial methodology. "a feed mixture of hydrocarbons, oxygen and water or water vapour..., is passed over the catalyst..." (emphasis added). This does not constitute a disclosure that of gasses passing through the catalysts in series. And it does not constitute a disclosure of "wherein a feed stream passed in a reactor chamber is exposed to the plurality of catalysts in a predetermined sequential manner," as is required in amended Claims 15 and 32.

c. On page 14 of the remarks, Applicant argued the following:

chamber." However, the contrary is true - Wieland fails expressly to disclose an entrance, fails to disclose an exit, fails to disclose an inlet, and fails to disclose an outlet, of any hydrogen reactor chamber.

A word search of Wieland reveals the terms "inlet surface" and "outlet surface," however, these terms have no context that is relevant to the present rejection - there is no disclosure in the written specification nor the Figures that line up those terms with any identifiable structural element. As such these terms are ambiguous. A skilled artisan would not understand an "inlet surface" to be the same thing as an "inlet." Wieland is vague, unclear and silent on any structural relationship between an inlet or outlet, and any catalyst. The conclusion that Wieland is ambiguous and lacks

Examiner respectfully disagrees. As set forth above, Wieland teaches an apparatus comprising:

a single hydrogen reactor chamber (Fig. 2) (Abstract) in which is disposed a plurality of steam reformation catalysts disposed therein (3 & 4 & 5) (as illustrated) to form a staged configuration, the staged configuration comprising a series of distinct zones or portions (i.e. from inlet to outlet - claims 4 and 5) (please read - col. 6, lines 9-22 and col. 7, lines 63 – col. 8, lines 1-10); each zone or portion in physical contact with at least one other zone or portion (as illustrated) and each zone or portion containing at least one of the plurality of steam reformation catalysts; wherein a feed stream passed in the reactor

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chamber is exposed to the plurality of catalysts in a predetermined sequential manner (col. 6, lines 9-22 and col. 7, lines 63 – col. 8, lines 1-15 - see also claims 4 and 5). Weiland's examples 1 and 2 in columns 6-8 of US 7,150,866 or in paragraph [0047] of US 2004/0063577 clearly states that the 3-layer catalyst is graded from inlet to outlet, and hence the feed stream is exposed to the plurality of catalyst layers in a sequential manner from inlet to outlet – see claims 4-5.

Hence, Weiland reads on the instant claims.

d. On page 13 of the remarks, Applicant argued the following:

" Weiland does not contain an enabling disclosure for the limitations that it is being applied for. Weiland discloses layers of catalysts in contact with a support body in Figures 1 and 2 Weiland describes that "a feed mixture of hydrocarbons, oxygen and water or water vapor..., is passed over the catalyst." (col. 3, lines 53-56, Weiland). However, Weiland fails to teach, either explicitly or inherently, that the feed mixture actually contacts each and every one of the catalyst layers nor does it teach sequential contact with layers. Weiland fails to teach, either explicitly or inherently, that the feed mixture necessarily contacts each and every one of the catalyst layers.

Examiner respectfully disagrees. As set forth in section 8 above that Weiland reads on the instant claims in that the feed mixture actually contacts each and every one of the catalyst layers – see Weiland's examples 1 and 2 in columns 6-8 of US 7,150,866. Since Weiland teaches applying a catalyst system to a honeycomb carrier, and teaches reforming methane to generate hydrogen (see Table I in Col. 8) then it is rather inherent that the honeycomb has an inlet and an outlet wherein the feed stream contacts all catalyst layers in the flow direction from inlet to outlet – see also claims 4-5. See example 2 wherein the water gas shift catalyst layer is applied to the last volume segment viewed in the flow direction (col. 8, lines 4-8). Table I in column 8 demonstrates that the feed

stream had to contact all catalyst layers to yield different composition of the product stream in each comparative example described therein.

### ***Conclusion***

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAITY V. HANDAL whose telephone number is (571)272-8520. The examiner can normally be reached on M-F 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Neckel Alexa can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/KAITY V. HANDAL/  
Primary Examiner, Art Unit 1723

11/13/2011

**Search Notes**

Application/Control No.

10/599,813

Examiner

KAITY HANDAL

Applicant(s)/Patent under  
Reexamination

CHELLAPPA, ANAND

Art Unit

1723

**SEARCHED**

Class	Subclass	Date	Examiner
Updated	Search	11/15/2011	KH

**INTERFERENCE SEARCHED**

Class	Subclass	Date	Examiner

**SEARCH NOTES  
(INCLUDING SEARCH STRATEGY)**

	DATE	EXMR
Updated Key Word Search in EAST	11/15/2011	KH
Updated Inventorship Search	11/15/2011	KH